Partner: Utah Department of Environmental Quality (DEQ) Division of Water Quality (DWQ)
Challenge: Filling gaps in toxicity protocols and profiles for brine shrimp and brine flies of the Great Salt Lake (ongoing)
Resource: Technical support for the development and implementation of acute and chronic toxicity testing for Great Salt Lake brine shrimp and brine flies

"ORD's active participation with this project has brought a depth of expertise that Utah and Region 8 were simply unable to provide. The value of their technically sound and practical advice can't be overstated." — Utah DEQ/DWQ Environmental Toxicologist Chris Bittner

Utah's Great Salt Lake (Lake) is the largest salt water lake in the western hemisphere and the 8th largest terminal lake (no outlet) in the world. The Great Salt Lake supports 7.5 million birds and is designated as a habitat of hemispheric importance by the Western Hemisphere Shorebird Reserve Network. The Lake contributes $1.1 billion annually to Utah's economy from mineral extraction industries and brine shrimp fishing. The Lake is the ultimate receiving water for the wastewater of approximately 78% of Utah's population. Utah's population continues to increase putting additional stress on the Lake's resources and services. The Great Salt Lake is both an economic and ecologic treasure, yet currently only has one water quality criterion (selenium).

National criteria are inappropriate for the Lake because of elevated and variable salt concentrations that support an unusual ecosystem. Salt concentrations lake-wide range from freshwater to 27% which is about 8-times saltier than seawater. The ideal salinities for a healthy brine shrimp population range between 10 and 20% but less is known about brine flies. Little or no toxicity data are available for brine shrimp and brine flies, the two-keystone species supporting the waterfowl and shorebirds.

EPA ORD, in collaboration with EPA Region 8 (Mountains and Plains), is assisting Utah DEQ/DWQ in the development and implementation of novel toxicity tests for brine shrimp and brine flies. The results of these tests will be used to support future numeric water quality criteria to protect the resource. Future work is also anticipated to include development of Lake-specific Whole Effluent Toxicity Tests. EPA remains committed to supporting Utah DEQ/DWQ and others' efforts to ensure that the water quality of Great Salt Lake continues to provide important recreational, ecological and economic benefits for current and future generations.

VERMONT

Partner: Vermont Department of Environmental Conservation (DEC)
Challenge: Prioritization of developed areas for retrofit stormwater best management practices (completed)
Resource: High resolution impervious cover data for Vermont watersheds

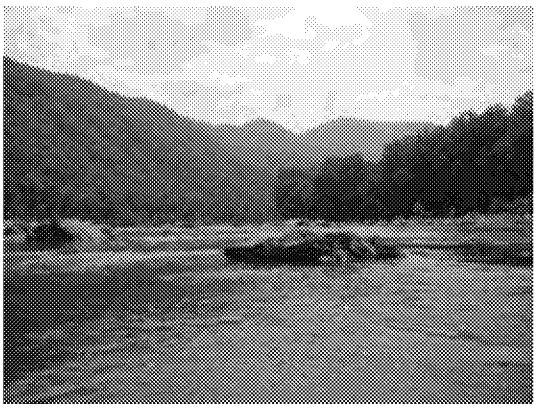
"The impervious cover data we received from EPA saved me one to two days of work in our efforts to bring increased awareness of the negative impacts on water quality of impervious surfaces which are directly connected to surface waters in developed areas. Increased awareness of problem areas helps us work with municipalities to mitigate impacts." – Vermont DEC Watershed Management Division, Hank (David) Ainley

EPA ORD has developed methods for high accuracy classification of high resolution (1-meter) imagery for impervious cover from the U.S. Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP) imagery for impervious cover with the understanding that such data are needed by states and local communities for infrastructure and development planning. Vermont DEC was looking for mapping data to quickly prioritize developed areas for stormwater best management practices retrofits. ORD was able to provide copies of the in-house developed high resolution impervious cover data, developed in-house, to Vermont DEC's Watershed Management Division.

Vermont DEC staff are now using these data in conjunction with mapped sewer drainages to quantify connected impervious cover in municipalities with wastewater treatment plants. Vermont DEC is also comparing the condition of streams in watersheds with differing levels of connectivity and using this information to inform decision on where to retrofit. Together Vermont and EPA are exploring ways in which ongoing ORD research on watershed-scale effects of nature-mimicking infrastructure development can complement the state's efforts.

VIRGINIA

Partners: Virginia Department of Environmental Quality (DEQ)
Challenge: Integration of state and national stream condition assessments (completed)
Resource: Probabilistic survey designs integrating national and state reporting requirements



"Virginia DEQ has found it very helpful to integrate our state stream condition assessment into the National Streams and Rivers Assessment. With technical assistance from ORD, we were able to apply robust statistical analysis to calculate a picture of stream health for the entire state from a small, manageable set of field samples." – Virginia DEQ Director David Paylor

Virginia DEQ is charged with reporting stream condition for the state, presenting a challenge to strategically conduct sampling protocols that will accurately represent stream water quality across the state's many streams without overwhelming state resources. EPA researchers have pioneered the design of just such survey techniques to assist water quality analysis across large areas. The EPA-developed strategy of probabilistic surveying has been incorporated into the National Aquatic Resources Surveys (NARS), which includes national-scale assessments of rivers and streams, lakes, coastal zones and wetlands.

Virginia DEQ took steps to integrate the state stream condition assessment requirements with the NARS National Rivers and Streams Assessment (NRSA). To achieve this, Virginia DEQ collaborated with EPA ORD to develop and interpret probabilistic survey designs specifically for their state stream condition assessments. The resulting survey design ensures representativeness of sampling locations, which then facilitates the use of statistical tools to determine condition values that incorporate acceptable levels of uncertainty. Virginia also adopted NRSA stream condition field and laboratory procedures to further integrate with the NRSA approach. Because of common measurements and survey design, Virginia will use the stream sites from their state program for the NRSA 2018-19 monitoring, thus promoting inter-calibration and efficiency.

WASHINGTON

Partner: Washington State Department of Natural Resources (DNR)
Challenge: Selecting sites for restoration of native seagrass beds and managing invasive species (ongoing)
Resource: Habitat suitability models for native and invasive seagrasses in collaboration with the U.S. Army Corps of Engineers

"The eelgrass biomass production model, developed by EPA ORD's Newport lab, is a critical module in the eelgrass site selection model. A multi-faceted team of state, federal and private sector scientists integrated an existing Puget Sound coupled physical and biogeochemical model with the eelgrass biomass production model to identify sites where the biomass of transplanted eelgrass would increase over time. Knowledge of these parameters vastly improve eelgrass restoration site selection and transplant success." – Washington State DNR, Aquatic Biologist Dr. Jeffrey Gaeckle

Seagrass meadows are valued by coastal communities and tribes as nursery habitats for fisheries species (such as Dungeness crabs, bay clams, Chinook and Coho salmon) and habitat for multitudes of forage species that support fisheries and wildlife in the Pacific bays and estuaries. Washington has a goal to increase the area of native seagrass beds in the Puget Sound by 20 percent by the year 2020. This requires knowledge of where restoration and habitat conservation efforts will be most successful. Washington State DNR, working with Pacific Northwest National Laboratory as part of the Puget Sound Partnership, has been using EPA ORD research on seagrass physiology to help identify locations where native seagrass (*Zostera marina*) are likely to thrive. These sites were then prioritized for further assessment and the potential for seagrass restoration. Sites with favorable environmental conditions based on model output are more likely to be successfully restored with eelgrass.

In Washington, Japanese eelgrass has been identified by the shellfish aquaculture industry as a noxious weed that disrupts the growth and harvest of Manila clams. ORD has also been conducting research on the ecology of Japanese eelgrass and developed a habitat suitability model to determine where this invasive species has the potential to become established. Knowing where the invasive seagrass is likely to colonize can assist aquaculture biologists in developing efficient surveillance and eradication plans.

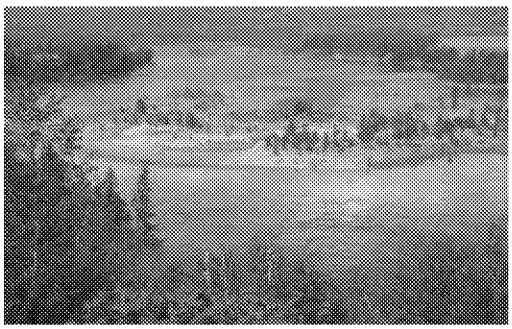
Partner: Washington State Department of Fish and Wildlife (DFW)
Challenge: Managing nutrients in riparian ecosystems for fish and wildlife benefits (ongoing)
Resource: Science synthesis of nutrient processes in riparian ecosystems

"EPA's willingness to co-author the nutrient chapter of the Washington DFW's riparian science synthesis document was critical to providing the best science to biologists, managers and policy makers throughout Washington. We viewed EPA as an essential partner that provided a very high level of expertise that Washington DFW simply did not have." – Washington State DFW, Chief Scientist Dr. Timothy Quinn

Riparian ecosystems and their streams are critically important locations for sustaining a healthy balance of nutrients –primarily carbon (C), nitrogen (N), and phosphorus (P) – across watersheds and far downstream. Vegetated riparian areas can be efficient natural filters by storing, removing and "fixing" potentially harmful excess nutrients that flow into aquatic ecosystems from uplands dominated by human activities, such as agriculture and urbanization.

To assist Washington State DFW, EPA ORD scientists provided state-of-the-science information on nutrients and riparian ecosystems as a chapter in an upcoming guidance manual designed for states, tribes and commercial interests responsible for managing riparian zones. The chapter provides a basic understanding of nutrient (C, N and P) cycling in riparian zones, including stream channels and Pacific Northwest groundwater. In highlighting the well-studied effects of various land uses, this chapter provides for state officials the key factors they need to consider for maintaining conditions needed for optimal nutrient transport, such as hydrologic connection, vegetation type, soil condition and salmon use of streams.

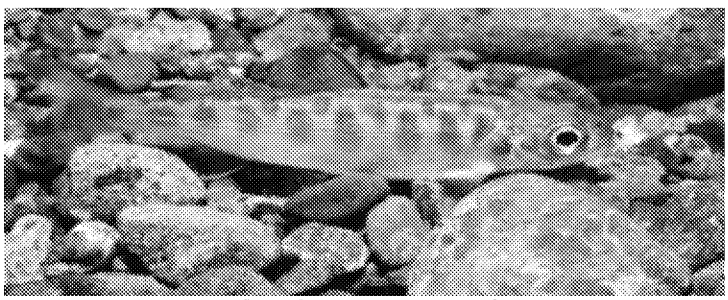
Partners: Washington State Department of Ecology
Challenge Upper Columbia River contaminated site (ongoing)
Resource: Technical support for remedial investigation/feasibility study



"Washington is addressing surface soil legacy smelter-emission impacts across a range of communities and settings spanning the state. The assessment of state-of-the-art, minimally disruptive exposure reduction surface treatment technologies for rural-residential and rural tribal-use settings common to the upper Columbia River Valley is a fundamental step toward identifying long-term cleanup measures. ORD's participation is highly valued to ensure honest assessment, input and multi-disciplinary scientific oversight." — Washington State Department of Ecology, Toxics Cleanup Program, Upper Columbia River Site Project Coordinator John Roland

EPA ORD, in coordination with Region 10 (Pacific Northwest), is providing technical support for the Upper Columbia River (UCR) Valley Superfund Site's remedial investigation/feasibility study. EPA ORD is a member of the UCR Soil Amendment Technologies Evaluation Study technical team established through the interaction of the Coleville Confederated Tribes, Washington State Department of Ecology, Teck Resources Limited, Ramboll Environ and EPA Region 10. EPA ORD is engaged as a third-party to provide an unbiased, scientific assessment of, and expertise on, soil amendment alternatives for soil lead and associated metals in the UCR area. Amendment alternatives being evaluated include phosphate, magnesium oxides, ECOBOND®, compost, biochar and other widely accepted treatment options for lead in soil. At this point, EPA has provided input on potential alternative treatments for the site, and provided input on testing that could be done to predict treatment suitability/effectiveness at the site. EPA ORD also participates in site meetings and teleconferences with the region, state and potentially responsible party to discuss the site soils and alternative soil remediation approaches.

Partners: Washington State Department of Ecology, Nooksack Indian Tribe, Lummi Nation
Challenge: Anticipating stream temperature stress on cold water fishes (salmon) in the Northwest (ongoing)
Resource: Long-term outlook models for rising stream temperatures to determine potential impacts of elevated temperatures and to examine potential mitigation strategies, in collaboration with the University of Washington, the U.S. Forest Service, NOAA Fisheries and U.S. Geological Survey



"Increased temperature and habitat degradation are a major threat to the many types of fish that live in this watershed. Through the process of research and data collection, we learned we must do everything we can to keep water quality conditions stable over the next few decades. We never would have had the ability to look into the future without the help of ORD." – Washington State Department of Ecology, Water Quality Engineer Steven Hood

Stream temperatures in the Pacific Northwest are projected to increase under future long-term weather scenarios due in part to increases in air temperature and in part to changes in water levels and water flow caused by altered rain and snowmelt patterns. Combined, these changes in stream temperature and hydrology could have substantial negative effects on cold-water fish species such as salmon. To better understand the potential impact of long-term weather changes on the potential to achieve water quality and salmon recovery goals, EPA ORD, in collaboration with Region 10 (Pacific Northwest) and the Office of Water, launched a collaborative research project in the South Fork Nooksack River with the Washington State Department of Ecology.

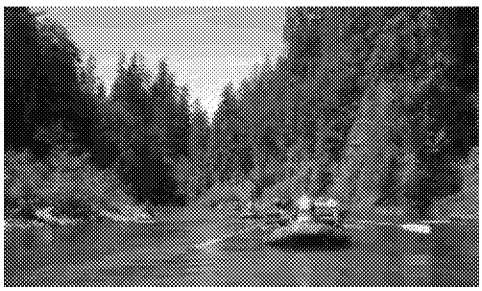
The research plan incorporates the total maximum daily load (TMDL) for temperature, which was developed by the Washington State Department of Ecology for the South Fork Nooksack River, as a pilot for integrating future weather scenarios into a watershed-specific plan to improve water quality for cold-water fish species. An overarching goal is to ensure that relevant findings and methodologies related to future stream temperature scenarios inform the South Fork Nooksack River Temperature TMDL Implementation Plan under development by EPA Region 10 and the state of Washington.

Partners: Washington State Department of Ecology
Challenge: Bunker Hill Superfund Site (ongoing)
Resource: Technical support

"The Washington State Department of Ecology appreciates ORD's involvement in the Bunker Hill Superfund Site. The tools being developed by ORD will not only ensure that lakes and marshes receive appropriate cleanups and reduce contaminant transport into Washington, but also may assist us in determining the best remedial strategies at our own cleanup sites." – Washington State Department of Ecology, Toxics Cleanup Program Hydrogeologist Sandra Treccani

The Bunker Hill Superfund Site, often referred to as the Coeur d'Alene River Basin Cleanup Site, is located in northern Idaho and eastern Washington where early mining and milling methods led to environmental contamination from mine wastes. EPA ORD is providing technical support for a portion of the site including the lakes, wetlands, flood plains and Coeur D'Alene river west of Bunker Hill. EPA ORD scientists continue to assist with document reviews for capping proposals, as well as other remedial design input for this mega-site. This site will be studied by EPA ORD soil scientists to identify remedial alternatives for Coeur d'Alene side lakes and marshes utilizing a historically heavily used marsh, Lane Marsh, for migratory birds. Successful pilot studies developed at Lane Marsh will be eventually be tested at other locations within this portion of the site.

Partners: Washington State Department of Natural Resources, Washington State Department of Ecology, Nisqually Land Trust, Nisqually Tribe
Challenge: Improve watershed condition for salmon recovery, clean drinking water and other ecosystem services (ongoing)
Resource: EPA watershed restoration planning tools (VELMA, Penumbra) and technical support



"Guided by sophisticated new modeling from EPA ORD's Western Ecology Division in Corvallis, combined with modeling used by the Nisqually Tribe for salmon recovery, the community forest's management team will selectively thin the property's timber stands to encourage old-growth forest characteristics and increase stream flow during the fall spawning season." – Nisqually Land Trust Executive Director Joe Kane

Intensive forest management in the Pacific Northwest during the past century has emphasized clearcutting on short harvest intervals (40-50 years). This highly profitable practice has converted the region's vast pre-settlement old-growth forests to young forest landscapes. This has fundamentally changed the functioning forest watersheds and their capacity to sustainably provide essential ecosystem services (nature's benefits) for local and downstream communities. Provisioning of drinking water, flood protection, fish and wildlife habitat, and recreational and cultural opportunities have been significantly degraded in many places.

Indicative of these widespread changes, Puget Sound salmon populations have declined sharply from historic levels. For example, 22 of at least 37 Chinook populations are now extinct, and many other species are listed as endangered. Communities, tribes and state agencies (Departments of Natural Resources and Ecology) are now collaborating throughout the region to implement salmon recovery plans that aim to restore hydrological and ecological processes critical to salmon recovery, and more broadly, to the functioning of entire watersheds and the ecosystem services they provide. A prime example is the Nisqually Community Forest (NCF), a novel collaboration of communities in southern Puget Sound (http://nisquallylandtrust.org/our-lands-and-projects/nisqually-community-forest/) aimed at acquiring private forest industry lands from willing sellers. The NCF is a working forest owned and managed for the benefit of local communities.

EPA ORD has developed and transferred modeling tools to NCF to support their salmon-recovery planning in the Mashel River watershed, a once prime salmon producing sub-basin of the Nisqually River. NCF staff are currently using EPA's Visualizing Ecosystem Land Management Assessments (VELMA) watershed simulator to quantify long-term effects of alternative management and climate scenarios on key salmon habitat and water quality variables. A key NCF goal is to design sustainable management plans that emphasize forest thinning and robust riparian buffers, a strategy shown by VELMA simulations to restore greater summer stream flows favorable to salmon spawning. Other ongoing NCF projects using VELMA include prioritization of land acquisitions, community-based best management practices and long-term management strategies.

Partner: Washington State Department of Ecology
Challenge: Understanding causes of change in nearshore ecosystems in Puget Sound (completed)
Resource: Projecting species vulnerability to changes in sea level, water temperature and coastal acidification with the Coastal Biodiversity Risk Analysis Tool (CBRAT)

"The work EPA is doing through CBRAT will provide essential knowledge on how climate change may impact the benthic community and inform how we clean up contaminated sediment sites and restore habitat to improve the health of Puget Sound." – Washington State Department of Ecology, Toxic Cleanup Program's Chance Asher

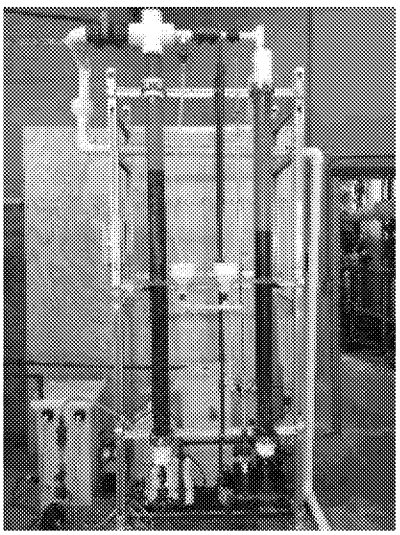
Since the 1980's, the Washington Department of Ecology has monitored seafloor condition as an indicator of the health of Puget Sound nearshore ecosystems. Sediment chemistry, toxicity, and benthic invertebrate community structure are monitored annually to determine whether sediment-bound chemical contaminants, water quality or other stressors have affected the composition of seafloor communities. Findings indicate declining quality of Puget Sound seafloor ecosystem condition; however, in many locations changes do not appear to correspond with sediment contaminant concentrations. Consequently, the Washington State Department of Ecology is investigating which non-contaminant stressors may be causing this decline, including increased carbon and nutrient loading, alteration of biogeochemical processes, and climate change.

The Washington State Department of Ecology requested information from EPA ORD scientists using the Coastal Biodiversity Risk Analysis Tool (CBRAT) to determine whether climate-related stressors may be contributing to observed declines, and to predict which stressors may be drivers in the future. CBRAT is a web-based tool that projects the risk that invertebrates and fish face due to changes in sea level, water temperature and nearshore ocean acidification based on the species' distribution, abundance, life history, and environmental tolerances. Washington State and EPA are using environmental and life history traits available in CBRAT to assess which Puget Sound seafloor invertebrates are most vulnerable to changing nearshore conditions. Those results will inform the state about whether climate variables may have contributed to recent changes in seafloor communities and to help forecast the composition of those communities under future near-shore climate scenarios.

For more CBRAT information: https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=311665

MULTI-STATE STORIES

Partners Iowa Department of Natural Resources (DNR), Illinois, Indiana and Ohio
Challenge: Ammonia found in drinking water in agricultural areas (ongoing)
Resource: Cost-effective treatment technologies for small drinking water systems with EPA licensed NoMoniaTM technology to reduce ammonia in drinking water, in collaboration with AdEdge Technologies



"Given the array of challenges faced by small drinking water systems, ORD's development of an affordable and easy to use ammonia treatment technology is very helpful to Iowa and many other states. Technical and research support of small drinking water systems is very important to Iowa." – Bill Ehm (former Iowa DNR Environmental Services Division Director)

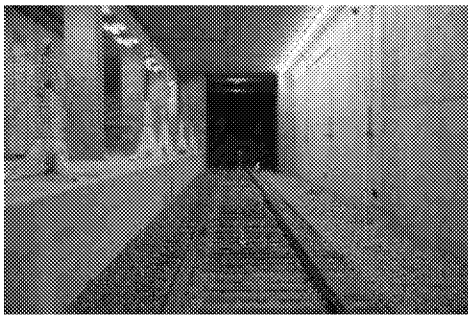
Across the United States, ammonia is found at high levels in many agricultural areas where groundwater is the primary drinking water source, and it can be a significant source of nitrate within the pipes of drinking water distribution systems. When nitrate exceeds regulated levels, it poses significant health risks to infants, causing symptoms that include shortness of breath and blue baby syndrome. Ammonia can also compromise the effectiveness of conventional water treatments for removing arsenic and other contaminants.

EPA ORD researchers developed a new, affordable and easy-to-use drinking water treatment system –now known to the world as Patent No. US 8, 029,674 and marketed commercially by AdEdge Water Technologies under the trade name NoMoniaTM – for small drinking water systems. The innovative technology uses naturally occurring microorganisms to remove ammonia and other potential contaminants. It is a single treatment process that generates no hazardous waste.

Working with AdEdge, EPA researchers conducted pilot tests in several small, rural communities, including Gilbert, Iowa, which uses a drinking water source that contains ammonia, iron, manganese and arsenic. The EPA technology proved to be the low cost, sustainable solution they needed.

NoMoniaTM was selected as the winner of the "Executive Board Technology Award" at the 2017 National Federal Laboratory Consortium. An announcement (April 2017) in Water Online notes that "The award highlights a successful technology transfer from a federal agency to a private sector company to commercialize, design, and market the aforementioned technology."

Partners: California, District of Columbia, Massachusetts, New York and Virginia
Challenge: Cleanup of an anthrax contaminated subway (ongoing)
Resources: Full scale demonstration of technologies



"The work being done with the Underground Transportation Restoration Operational Technology Demonstration project has been critically important to helping Washington Metropolitan Area Transit Authority and other mass transit properties face the daunting preparedness challenges associated with an accidental or intentional release of a biological agent in the underground transportation environment. The project has helped inform our leadership in determining operational strategies that will lead to a more rapid return to service following such an event." — Homeland Security Investigations and Intelligence Bureau Metro Transit Police Department, CBRN Coordinator Brandon W. Graham

Following the 2001 anthrax attacks, cleanup of the Hart Senate Office Building and Brentwood postal facility cost in excess of $1 billion, and resulted in the Brentwood postal facility being closed for over two years. Since that time, EPA ORD has done a great deal of work to improve the nation's ability to cleanup buildings contaminated with anthrax or other biological agents. In recognition of the complexities that would be involved, and the number of cities that have underground rail systems, EPA along with the Department of Homeland Security, the Department of Defense and several national laboratories turned their attention to the cleanup of subway systems that could be contaminated with anthrax.

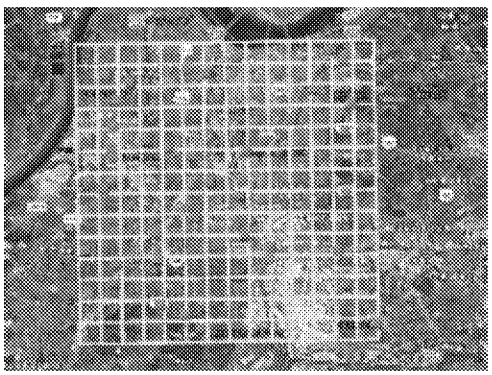
The Underground Transportation Restoration (UTR) Operational Technology Demonstration (OTD) was conducted during September 2016 at Fort A.P. Hill's Asymmetric Warfare Training Center to evaluate decontamination technologies that could be used in the event of an anthrax incident in a subway system. The project used a non-pathogenic surrogate that behaves much like anthrax spores in terms of how it is transported in the air, settles and how it can be killed.

The project consisted of two rounds of background sampling, agent release, decontamination, sampling, waste removal and decontamination, and post-decontamination sampling. The technologies that were evaluated included a fogger that produced a fog from diluted bleach and a skid mounted sprayer that sprayed a liquid pH adjusted bleach solution. Both technologies were selected because they are off-the-shelf and could easily be purchased in an emergency.

Thousands of post decontamination samples were collected and are currently being analyzed, and a report is expected to be published in 2018. The success of the decontamination efforts will not be known until the samples are processed and results available and studied, but the demonstration was helpful in defining the many challenges that could be faced during a real incident including sealing portions of a subway tunnel, sampling unique surfaces such as railway ballast, and managing wastes that cannot be decontaminated in situ.

Watch the Underground Transportation Restoration Project video to learn more.

Partners: Florida Department of Environmental Protection, Georgia Environmental Protection Division, Kentucky Department of Environmental Protection, North Carolina Department of Environmental Quality, South Carolina Department of Health and Environmental Control and Tennessee Department of Environment and Conservation
Challenge: Characterizing urban background levels for contaminated site cleanup levels (ongoing)
Resource: Sampling protocol



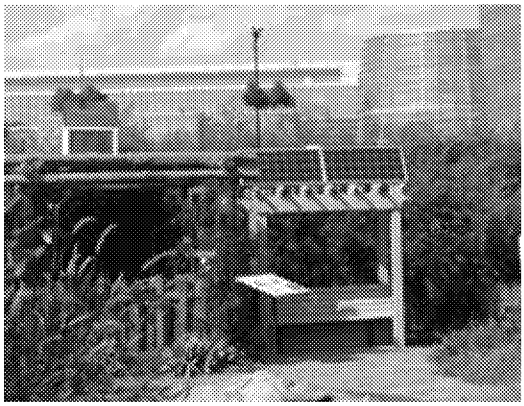
"Having a data set like the one gathered during the urban background study is invaluable. It is very helpful to now have a comprehensive data set that we can use to make scientific determinations regarding appropriate urban background concentrations for many constituents."– Tennessee Department of Environment and Conservation Environmental Consultant Merrie Embry, in the Memphis Environmental Field Office, who also noted that the benefit of working with EPA ORD and the other Southeastern states has helped to ensure consistency in their sampling approach and data evaluation.

In 2015, EPA scientists partnered with several Region 4 (Southeast) states to figure out how urban background contaminants differ from industrial waste at urban sites. Initial efforts were focused on creating a process for both soil sample collection and analysis that could be consistently applied across southeastern cities.

Soil samples collected from Louisville, KY; Lexington, KY; Memphis, TN; Raleigh, NC; and Winston-Salem, NC, were analyzed in EPA laboratories and added to a growing urban background database for metals and PAHs. The data and sampling process can be used by EPA, state agencies and local authorities to assess hazardous waste and brownfield sites and make decisions around cleanup. The database will provide a general range of urban background contaminant levels to be expected from sites in Region 4 cities. It can also serve as a screening tool for comparison of potential sites. The utility of the tool is improved as coverage of data for comparison over broader areas increases and more urban background data are added.

The success of the project has allowed sampling efforts to expand to additional cities in Tennessee, Georgia and Florida. Recently, EPA and the state of Tennessee have used the study protocol to conduct an urban background sampling effort in Chattanooga, TN. Additional regions, states and universities, including Georgia State University in Atlanta, have expressed interest in the results and established sampling process. Professors and students at the University of Florida in Gainesville have already used the sampling process in two urban areas in central Florida.

Partners: Participating pilot locations including the cities of Chicago, IL; Durham, NC; Hartford, CT; Houston, TX; Kansas City, KS; Oklahoma City, OK; Philadelphia, PA and Washington, DC
Challenge: Air quality monitoring for community awareness (ongoing)
Resource: Village Green Project

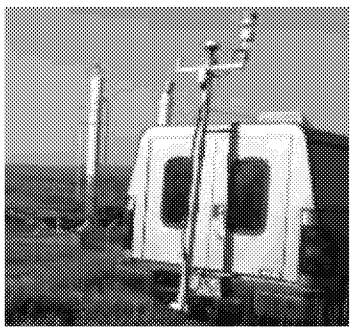


"The Village Green station is a helpful tool in educating the public, and particularly children, about the importance of air quality in our everyday lives. We are thankful to be one of several cities across the country to have such an innovative tool." – Oklahoma DEQ Executive Director Scott Thompson *(referring to the Village Green Project in Oklahoma City)*

The Village Green Project (VGP) is a novel air and weather measurement station originally developed by EPA ORD scientists. The station is a compact, solar-powered system that incorporates air and weather instrumentation into a park bench. The project builds upon the need to enhance transparency and showcases next-generation air measurement technology by providing quality-assured data to the public on a near real-time basis, updating to a public data website every minute.

The original prototype was field-tested outside a public library in Durham, NC. Following the successful prototype test, EPA created a pilot VGP expansion and engaged with state, local and tribal agencies in placing new park bench stations in various community environments. There are currently eight Village Green stations in the U.S. located in a variety of environments selected by the grant recipients, such as libraries, a public garden, and high foot-traffic tourist areas. In addition to Oklahoma City, OK and Durham, NC, participating cities include Hartford, CT, Kansas City, KS, Houston, TX, Washington, DC, Chicago, IL, and most recently Houston, TX. The state and local agencies have used the stations as an opportunity to host public outreach events, including ribbon-cutting ceremonies and informational sessions.

Partner: Wisconsin Department of Natural Resources (DNR), Lake Michigan Air Directors Consortium (LADCO)
Challenge: Better understanding of Lake Michigan's ozone formation and transport (ongoing)
Resource: Reference methods, optical and remote sensing analyses and federal research vessel in collaboration with the National Oceanic and Atmospheric Administration (NOAA), NASA, the University of Iowa, the University of Northern Iowa, the University of Minnesota, the University of Wisconsin via the National Science Foundation, and the Electric Power Research Institute (EPRI)



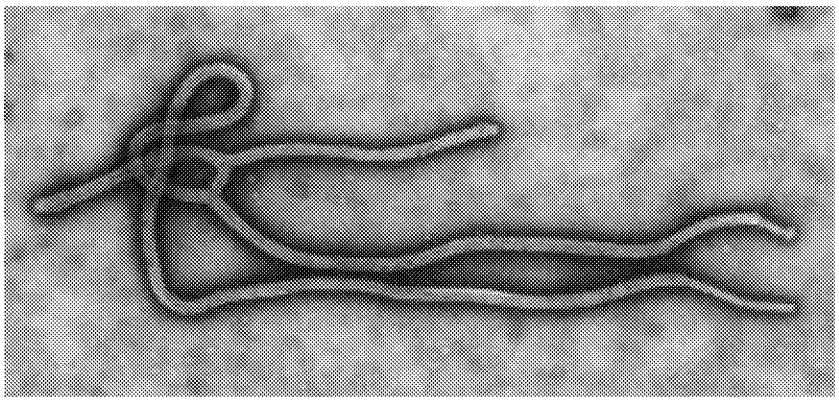
"This study will improve the models that we use to inform science-based decision making." – Wisconsin DNR, Environmental Management Division Assistant Deputy Secretary Pat Stevens

Ozone is formed when compounds such as nitrogen oxides (NOx) and volatile organic compounds (VOCs) react with sunlight. Despite dramatic reductions in these ozone precursor emissions, many areas bordering Lake Michigan continue to experience elevated ozone concentrations. This long-standing issue is one of the more challenging air quality issues in the eastern U.S.

A problem that is hindering states and stakeholders addressing this challenge is that Lake Michigan's unique meteorology and ozone chemistry, including the transport of ozone and ozone precursors in the region, are not completely understood. Photochemical models are important tools for understanding such transport issues. However, these models historically have been unable to reproduce the lake breeze effect present around Lake Michigan, making it difficult for states, the LADCO and EPA to accurately predict and address ozone concentrations along the Lake Michigan lakeshore. LADCO is a regional planning organization that includes representation from Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin (http://www.ladco.org/about/index.php).

In the summer of 2017, EPA ORD, LADCO, academic institutions, and other state and federal agencies pooled their expertise and resources to commence a field study to collect information that will be used to better inform air quality models and ultimately help understand ozone formation around Lake Michigan. EPA ORD, in conjunction with NOAA and NASA, outfitted a NOAA research vessel with EPA instruments to support over-the-water measurements. NASA and EPRI are providing airborne remote sensing measurement to complement EPA and state surface measurements to help understand pollutant transport over Lake Michigan. These measurements will be combined with satellite data to better understand ozone chemistry and transport over the area, and better inform efforts to reduce ozone formation along the shoreline.

Partners: Maryland Department of Health and Mental Hygiene (DHMH), New York State Department of Environmental Conservation (NYSDEC)
Challenge: How best to decontaminate materials and manage waste and wastewater contaminated with the Ebola virus (completed)
Resources: Technical assistance



"During the 2001 and 2006 anthrax incidents in New York City and the 2014 Ebola crises, New York state reached out to EPA ORD and Region 2 staff for their experience and acumen to collaborate on creating a 'complete waste solution.' This involved designing training sessions, developing a computerized decision support tool (I-WASTE), a NYC Environmental Response and Remediation Plan for Biological Incidents, and conducting and publishing research on the ability of commercial autoclaves to treat thermally resistant anthrax spores and the triple packaging used for transport of highly infectious agents. EPA ORD and Region 2 staff have been responsive to all of our state's requests for assistance. Collaborative efforts by EPA and the NYSDEC have contributed significantly in the management of biohazardous waste that has been both timely and crucial to protecting public health and the environment in New York State and nationally." – NYSDEC Division of Materials Management Research Scientist Alan Woodard, PhD

In 2014, there was an outbreak of Ebola cases in the United States. EPA ORD researchers were called upon to provide technical support to states in responding to the emergency. EPA ORD scientists provided technical support related to decontamination products and best ways to use them. They also delivered expert recommendations for best decontamination methods for personal protective equipment, a critically important issue for health care workers and others who came into contact with Ebola patients. EPA ORD provided instruction on how waste contaminated with the Ebola virus should be managed and the fate of the virus in wastewater. In addition, EPA ORD participated in a workshop with the Maryland DHMH and contributed to the National Security Council's development of the *Multi-Agency Interim Guidance on Management of Wastes containing Category A Infectious Agents*, such as Ebola. With EPA ORD technical support and assistance, Maryland and New York were in a better position to address the challenges associated with managing waste from the Ebola crisis.

Partners: Alliance for Chesapeake Bay, Chesapeake Bay Foundation, Dauphin County Conservation District, Lancaster County Clean Water Consortium, Lancaster County Conservancy, Lebanon County Conservation District, Pennsylvania State University and Susquehanna River Basin Commission
Challenge: Managing stormwater treatment systems to protect and to restore water quality in the Chesapeake Bay (completed)
Resource: Center for Green Infrastructure and Stormwater Management

"An ounce of stormwater pollution prevention is worth a pound of cure, particularly when it adds multiple benefits through green infrastructure and natural treatment systems. The Center helps Chesapeake Bay states and stakeholders find solutions to some of our most challenging water quality problems through science-based innovation and collaboration." – Maryland Department of the Environment Secretary Ben Grumbles

The EPA ORD-supported Center for Green Infrastructure and Stormwater Management was established to conduct interdisciplinary research to understand and to influence how decisions are made at multiple spatial and jurisdictional scales to manage stormwater treatment systems that protect and restore water quality in the Chesapeake Bay. By the time indicators of impairment are measured within the Chesapeake Bay, the opportunity for adaptive management to alleviate the degradation of water quality may have already passed. It is therefore imperative to identify headwater landscapes that are particularly vulnerable to stress from high pollutant loads, population growth and changes in land management.

The Center serves as a focal point to bring together stakeholders and researchers from multiple disciplines to improve stormwater management in urban and suburban settings; to reduce pollutant loads of nutrients, sediments, organics and metals; and to minimize stormwater volume and energy use across a range of storm event magnitudes. To accomplish these objectives, the Center identified the cognitive and institutional barriers preventing communities from adopting green infrastructure measures to manage stormwater. Additionally, the Center designed green infrastructure and developed methods to help stakeholders visualize alternative infrastructures. It modeled the environmental and financial benefits of these alternative infrastructures and served as a forum for stakeholder discussions.

Partners: Maryland Department of the Environment (MDE), California, Colorado, Connecticut, Kentucky, New Hampshire and Oregon
Challenge: Identifying appropriate opportunities to use advanced monitoring tools, new data collection and analysis techniques to create improvements and gain efficiencies in environmental monitoring (ongoing)
Resources: Development, pilot testing, and evaluation of advanced monitoring technologies

"Our partnership with EPA on advanced monitoring is extremely important. With new sensors entering the market every day, understanding if they work and how to communicate the data they generate is a critical need for state environmental agencies. In 2017, two major sensor studies are taking place in Baltimore, where hundreds of stationary and mobile sensors will be collecting data on multiple air pollutants and greenhouse gases. This partnership with EPA is both critical and timely." – MDE Secretary Ben Grumbles

Environmental monitoring is in the midst of a paradigm shift from data being collected, stored, distributed and communicated by the government to data being collected by anyone, anywhere and at any time. This shift is driven by recent technological advances, ubiquitous data communications and the reduced cost of monitoring technology.

EPA and the Maryland Department of Environment are co-leading a state-EPA effort to determine how to fully take advantage of rapid changes in environmental monitoring technology. New advanced monitoring technologies are already available that are smaller, more portable, and less expensive than traditional methods. However, the rapid evolution of monitoring technology also presents challenges to government agencies, the public and the regulated community because the performance (i.e., accuracy, precision and reliability) of new technologies is largely uncharacterized. Communities, citizens, industry and local, state, federal and tribal agencies are asking the same question: "How good is it?"

In April 2016, the state-tribal-EPA collaborative E-Enterprise for the Environment Leadership Council recommended five actions for joint EPA-state work: 1) perform a detailed options and feasibility analysis on the creation of an independent third-party evaluation/certification for new technologies; 2) develop scanning and screening procedures within EPA and the states to help users make decisions on which equipment they should purchase or pilot; 3) develop messaging and tools to support the interpretation of monitoring results to ensure that data are properly interpreted and communicated to the public; 4) develop data standards for advanced monitoring technologies to facilitate distribution, sharing and integration of data; and 5) identify and implement efficiencies in current technology approval processes. EPA ORD is supporting these joint efforts, while continuing research on the use and performance of new monitoring technologies. For example, an EPA-supported research center will deploy a large, distributed network of low-cost air quality monitors in Baltimore and will collect data to assess variability in pollutant concentrations, source contributions and exposures across in the city.

Partners: Northeast States for Coordinated Air Use Management (NESCAUM), an association of eight Northeastern States including Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont
Challenge: Northeastern states' planning for energy and air emissions (completed)
Resource: Energy system database

"EPA ORD, through its research programs, is well-positioned to support us in better understanding the numerous multi-state origins and inter-state transfer of air pollution and how it evolves as it travels to Rhode Island. No individual state in the Northeast is capable of studying this complicated issue alone." – RI Department of Environmental Management Director Janet Coit

The MARKet ALlocation (MARKAL) tool is used to model the nation's energy system and evaluate different energy technology options for reducing air quality emissions. The tool uses energy and water technology data to create future scenarios or options for optimizing water and energy consumption and management. City planners can run simulations on a variety of policy options to evaluate the most cost-effective and environmentally sustainable solutions for providing energy- and water-related services such as heating, cooling, and water and wastewater treatment.

EPA ORD has collaborated with NESCAUM in the further development of a MARKAL model tailored specifically to the energy infrastructure of the Northeast. This NE-MARKAL model was based on ORD's U.S.-scale 9 region MARKAL/TIMES optimization model database used by decision makers for coordinated energy and air emissions planning. ORD provided expertise and support for the development of state-level model database(s) and implementation of the modeling framework and case studies. The NE-MARKAL framework will be used by decision makers to examine energy policy options and their resultant impacts on energy services in the region.

Partners: Local and regional beach managers across states that border the Great Lakes, as well as other states
Challenge: Predicting water quality at beaches (completed)
Resource: Virtual Beach software

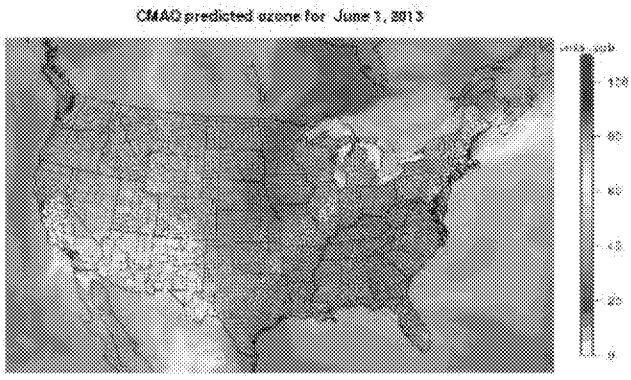
"This reliable, predictive water quality model is key to protecting health and promoting recreational enjoyment of our beaches. The model provides same-day public notifications of beach conditions at a lower cost than traditional monitoring. Communities that use Virtual Beach can dedicate more of their resources to locating and correcting sources of contamination and improving local beaches. The (Wisconsin DNR's) partnership with EPA in the development of this practical scientific tool offers a great pay off." – Wisconsin DNR Cathy Stepp (former secretary)

To protect public health, beach managers need to continually assess the level of potentially harmful microbes (primarily bacteria) in the water. However, traditional, culture-based testing methods take a full 24 hours to get results – preventing same-day, proactive beach closures and leaving many recreational swimmers open to sickness or infection. EPA's Virtual Beach tool offers a solution.

Virtual Beach (VB) is a Windows desktop-based software package designed by EPA researchers that provides rapid, real-time assessments of microbial water quality with model accuracy typically exceeding 80 percent. Beach managers use VB to develop site-specific statistical models for predicting fecal contamination based on readily-available data on such as wind direction/speed, rainfall and cloud cover as well as wave height, water turbidity and sunlight intensity. Once a model is developed for a site using historical data, environmental information can be collected at a site in the morning, and moments later the model can produce a prediction to guide decisions about closing the beach for the day or for issuing advisories.

VB is used to assist in advisory issuances in the Great Lakes states and to forecast water conditions in numerous locations in locations in Illinois, Indiana, Maryland, Michigan, Minnesota, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, and Wisconsin. VB supports efforts to support the local economy while protecting the health of residents.

Partner: Maryland Department of the Environment (MDE) and other state air agencies
Challenge: Need for effective strategies to reduce harmful air pollutants (ongoing)
Resource: EPA's Community Multiscale Air Quality (CMAQ) Modeling System



"Maryland has made dramatic progress over the past 10 years in reducing ozone and fine particle pollution. We have invested heavily into research and modeling and this investment has been one of the reasons we have been successful. The CMAQ photochemical model has been the key tool we have used to design and refine control strategies. It has helped us find least cost solutions to reduce ozone and fine particle pollution." — MDE Secretary Ben Grumbles

For more than 15 years, EPA and states have been using EPA's Community Multiscale Air Quality (CMAQ) Modeling System, a powerful computational tool for air quality management. CMAQ simultaneously models multiple air pollutants, including ozone, particulate matter and a variety of air toxics to help air quality managers determine the best air quality management scenarios for their states and communities.

State agencies that control air pollution use CMAQ to develop and assess implementation actions needed to attain National Ambient Air Quality Standards (NAAQS) mandated by the Clean Air Act. States use the tool to identify sources of air quality problems and to assist in the design of effective strategies to reduce harmful air pollutants. Using data about land use, meteorology and emissions, CMAQ provides detailed information about the concentrations of air pollutants in a given area for any specified emissions or air quality scenario. With information generated by CMAQ, states are able to examine the estimated impacts of different air quality policies.

The National Weather Service also uses the model to produce air quality forecasts twice daily, and the Centers for Disease Control and Prevention uses CMAQ data in two community-focused tools that allow users to access county-specific air quality information on pollutants, such as ozone and particulate matter.

CMAQ has a worldwide user community with users in 125 countries. The system brings together three kinds of models including: meteorological models to represent atmospheric and weather activities; emission models to represent man-made and naturally-occurring contributions to the atmosphere; and an air chemistry-transport model to predict the atmospheric fate of air pollutants under varying conditions. The newest version of the model (CMAQ 5.2) was released in June 2017.

Partner: Interstate Technology and Regulatory Council (ITRC)
Challenge: Need for specialized risk assessment training (completed)
Resource: Training module, *Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment*

"The experience and knowledge of EPA scientists were essential to the success of this important training used by state risk assessors and others to address complex challenges at contaminated sites." – California Department of Toxic Substances Control (State Co-Chair) Claudio Sorrentino

"The ITRC risk training is more robust as a result of our partnership with EPA experts on this effort." – South Dakota Department of Environment and Natural Resources (State Co-Chair) John McVey

EPA ORD partnered with ITRC, a program of the Environmental Research Institute of the States, to develop specialized training for state risk assessors responsible for the cleanup of chemicals released into the environment. Based on feedback from EPA's Risk Assessment and Training Experience (RATE) program, ORD scientists reached out to ITRC and proposed that ITRC create training modules on the harmonization of risk assessment approaches across state regulators. EPA experts provided materials developed for its RATE program for the ITRC effort. These materials provide up-to-date and comprehensive training for human health risk assessment, ranging from beginner to expert classes.

The ITRC team of approximately 75 representatives from various environmental sectors completed a comprehensive web-based training module entitled, *Decision Making at Contaminated Sites: Issues and Options in Human Health Risk Assessment*. ORD scientists provided expert technical support as needed along the development processes and extensive peer reviews before release of the final product. Currently, all interested risk assessors in the U.S. and around the globe have free access to this important training material (http://www.itrcweb.org/risk-3/). To date, more than 2,700 people have taken the online course and the associated guidance document is available to download.

Partner: Colorado, Florida, Kentucky, Michigan, New York and Ohio
Challenge: Simulating and monitoring conditions in drinking water utilities (ongoing)
Resources: Technical assistance and field support

"Having access to my operational data in real-time keeps me on top of the system performance even when I am not at the plant. This tool helps me manage my staff and resources by providing greater flexibility and real-time information." – Milford, OH Water Department Supervisor Matt Newman

EPANET-RTX (real-time extension) and RTX:LINK are software tools that have helped states and their drinking water utilities by allowing continuous monitoring of their operations to improve water quality and respond to incidents. Together states and their utility partners use the tools to better understand and help improve drinking water system operations.

EPANET-RTX was developed to allow utilities to link their raw Supervisory Control and Data Acquisition (SCADA) data with the EPANET distribution system hydraulic model to evaluate conditions in the system in real time. The development of real-time analytics can provide utilities with the necessary tools to enhance system operations including emergency response, improved pressure management, leak detection and water quality. EPANET-RTX is currently in use in many locations including Ohio, Colorado, Florida, Kentucky, Michigan and New York.

To make real-time monitoring available to small systems that lack powerful computing capability, RTX:LINK provides access to the SCADA data through mobile applications and desktop computers. RTX:LINK software provides simple and secure access to key water utility operational data streams, using web-based dashboards for trending and alerting. With RTX:LINK drinking water utilities have the ability to better understand water quality and operational conditions in their system at any point in time.

RTX:LINK software is easy to install on popular SCADA systems and has been tested in several locations. RTX:LINK has been piloted in the Milford, Ohio, water system, where it has provided 24 hour access to current and historical tank levels, pump statuses and distribution system flows via mobile or desktop devices. RTX:LINK is also being tested in the city of Flint, Michigan, where it is being used to provide the same benefits as those in Milford along with a continuous, real-time understanding of water age. Using this technology has helped these water systems optimize operation, identify water losses or low pressure areas, and help predict available pressure for firefighting should any disruption occur in the distribution system.

Partners: Ohio Environmental Protection Agency (EPA), Association of State Drinking Water Administrators (ASDWA) and other state contributors
Challenge: Providing information, technical assistance and training to small drinking water systems (ongoing)
Resource: Webinars, workshops and workgroup to address challenges and treatment solutions for small systems

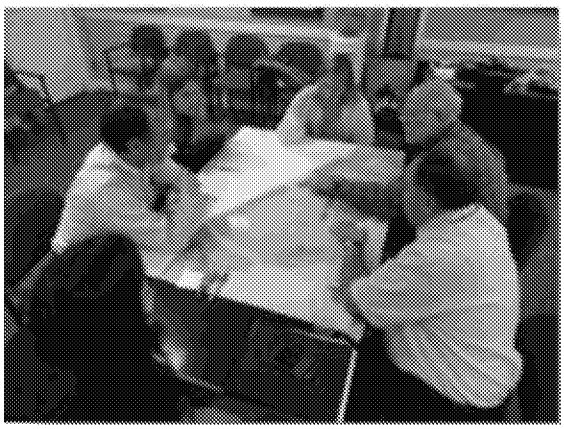
"It's very important that we provide small water systems with timely, easy to use, and accessible tools and training to assist in operating these critical public water systems, and the webinars and one-on-one meetings are perfectly suited to meet this need." – Ohio EPA Director Craig Butler

EPA ORD and Office of Water, in coordination with Ohio EPA and ASDWA, began hosting a monthly webinar series in 2015 that is targeted for state agencies on challenges and treatment solutions for small water systems. Because they tend to have fewer resources than larger systems, small systems can face enormous challenges in consistently providing safe and reliable drinking water. The series allows EPA to provide training and foster collaboration and dissemination of information, which, in turn, is helping state agencies communicate the latest scientific advancements and current guidance to their small systems. It also serves as a forum for the invaluable flow of information, providing critical insight about the problems small water systems are currently encountering in their day-to-day interactions. With that increased awareness, ORD experts can then modify their research to solve real-world problems that small systems are experiencing.

As of August 2018, the series has attracted over 35,000 participants from all 50 states, 38 Tribal Nations, 4 U.S. territories, and 30 other countries, and has provided over 22,000 continuing education credits (supported by Ohio EPA). Presenters include representatives from state drinking water agencies to help encourage communication between the states. For the webinar series schedule, registration and past recordings, visit EPA's website at www.epa.gov/water-research/small-systems-monthly-webinar-series.

In addition to the webinar series, EPA hosts an annual small drinking water systems workshop in collaboration with ASDWA. This free, face-to-face workshop offers in-depth training and information for handling small drinking water systems problems and compliance challenges. It is primarily designed for state personnel responsible for drinking water regulations compliance and treatment technology permitting. The workshop typically attracts between 350-400 attendees from across the Nation. This year's workshop will be held August 28-30 in Covington, KY (Greater Cincinnati Area); registration is available at https://www.epa.gov/water-research/15th-annual-epa-drinking-water-workshop-small-systems-challenges-and-solutions. Formed during the 2011 workshop, ORD also leads a small drinking water systems technical communications workgroup to focus on targeted communication efforts between EPA and the states, taking into account the different needs of system operators. In addition to EPA staff, the workgroup includes state regulatory agency and small water utility representatives from 13 states. A successful lead-free communications tool has been developed, and the workgroup meets on a regular basis to decide on needed topics for the webinar series and to discuss the development of new tools.

Partners: Stafford County, VA; City of Baltimore, MD; York, PA
Challenge: Methods to address the effects of current and future changes in storm intensity, heavy precipitation events, and more frequent and severe floods in stormwater management planning (completed)
Resource: Technical support to identify barriers and provide tools, data, methods and actions to facilitate planning for impacts of more frequent and severe storms and floods in collaboration with the National Oceanic and Atmospheric Administration (NOAA) and their partners



"Effective planning requires a clear understanding of the science. To that end, the help we are receiving from EPA scientists is critical to enabling us to come up with short and long- range plans that will protect our lands and our waterways." – VA Department of Environmental Quality Director David Paylor

Changes in storms and heavy precipitation events, along with land use changes such as development, can significantly affect the volume of stormwater runoff that municipalities must manage to protect public health and water quality. Local decision makers have identified the need for information that would be useful for planning and adapting local stormwater management plans and controls to account for these changes.

To address this need, EPA ORD scientists and colleagues from NOAA held workshops and led other community-level efforts across states within the Chesapeake Bay and Great Lakes regions. The collaborations resulted in jointly derived insights into how scientific information on weather and climate can be most effectively disseminated to help communities increase the resiliency of stormwater systems in the face of current and future land use changes and more intense storms and floods. In particular, discussions focused on opportunities to implement infrastructure based on low-impact development practices, such as rain gardens that collect and absorb runoff from rooftops, sidewalks and streets, and other alternative management strategies. A summary report was prepared to inform states and communities on implementing stormwater management plans ((https://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=310045).

Partners: Depts. of Environmental Protection (KY, MA, ME, NJ, PA and WV); Depts. of Environmental Management (AL and RI); CT Dept. of Energy & Environmental Protection; DE Dept. of Natural Resources and Environmental Control; Depts. of Natural Resources (GA, MD and Red Lake Nation (tribal)); MA Dept. of Fish & Game; NH Dept. of Environmental Services; Depts. of Environmental Conservation (NY and VT); Depts. of Environmental Quality (NC and VA); SC Dept. of Health & Environmental Control; TN Dept. of Environment & Conservation; VA Dept. of Game and Inland Fisheries; Susquehanna River Basin Commission; TN Valley Authority
Challenge: Develop a baseline monitoring network to detect long-term trends (ongoing)
Resource: Technical support to states and tribes through workshops and stream monitoring network development, in collaboration with the U.S. Forest Service and the U.S. Geological Survey

"As an interstate agency, the Susquehanna River Basin Commission (SRBC) certainly recognizes the value of the regional partnership EPA has assembled to address the need for collecting the data necessary for detecting changes to water quality and aquatic life communities over time, especially as it relates to any regional trends that may result from climate change effects. The establishment of an effective regional network is a bigger task than any single agency can undertake given the resources involved, and EPA's staff provided the needed leadership to establish and guide the partnership, as well as the scientific expertise on the study methods for characterizing any future changing conditions." – SRBC Executive Director Andrew Dehoff

EPA ORD is working with our regional offices, states, tribes, river basin commissions and other entities to establish Regional Monitoring Networks (RMNs) for freshwater wadeable streams. The objectives of the RMNs are to collect long-term biological, thermal, hydrologic, physical habitat and water chemistry data to document baseline conditions across sites and detect long-term changes. Consistent methods are being used to increase the comparability of data, minimize biases and variability, and ensure that the data meet data quality objectives. Continuous sensors are being employed when possible. RMN surveys build on existing state and tribal bioassessment efforts with annual sampling of a limited number of sites that can be pooled at a regional level. Pooling data enables more robust regional analyses and improves the ability to detect trends over shorter time periods. The collaborations across states, tribes and other entities resulted in the development of RMNs, some of which have collected data since 2012. Recently, EPA Regions 1, 2, 3 and 5, in coordination with their states and tribes, began developing RMNs for lakes and wetlands with the same objectives as the stream RMNs.

RMN data can be used for many purposes, over short and long-term timeframes. These applications include informing water quality and biological criteria development and protection planning priorities, refining lists of biological, thermal and hydrologic indicators, and detecting trends in commonly-used water quality and biological indicators. The RMN data also are important for detecting climate change effects in the context of biomonitoring. There are a number of climate change projections that are relevant to aquatic life condition, including increasing temperatures and changing frequency and magnitude of extreme precipitation events and frequency of summer low flow events. Managers will be able to use the monitoring data to help inform adaptive management.

Partner: New York City, Ohio EPA, Columbus, OH City Council
Challenge: Cleaning up after a wide area radiologic incident
Resources: Full scale demonstration of technologies in collaboration with the U.S. Department of Homeland Security (DHS)

"It's a great advantage to us to have the federal authorities look at these products, be able to test them, with input obviously from the local response organizations that are going to respond, to see what is the best product on the market." – Charlotte-Mecklenburg Emergency Management Coordinator Michael Tobin

EPA ORD, in collaboration with DHS, conducted the Wide-Area Urban Radiological Contaminant, Mitigation and Cleanup Technology Demonstration in Columbus, OH in June 2015.

This demonstration provided first responders with options for response to a wide area radiological incident, such as a dirty bomb explosion or a nuclear accident, by showing the responders the operation feasibility of the tools in real time.

Five radiological decontamination technologies (including strippable coatings, gels and chemical foam) were demonstrated on an urban building. Decontamination technologies were applied to remove contaminants from the building's surfaces by physical and chemical methods. In addition, vehicle wash technologies as well as several approaches to contain wash water and radioactive particles were demonstrated. "Radiological contaminant mitigation" technologies are measures taken to reduce adverse impacts of radiological contamination on people and the environment, and to facilitate restoration of first responder services and critical infrastructure. Radiological contaminant mitigation technologies are designed for containing and removing radiological contamination on the surface in the first hours or days following a radiological event. Such technologies include "radiological particle containment," which is designed to prevent the spread of particles that might result from vehicle or foot traffic. Radiological particle containment technologies are applicable for early phase response to contain the radionuclides and to reduce radiation dose to responders and the public. Radiological contaminant mitigation also includes "gross decontamination," which is performed with the goal of reducing contamination levels. This reduction may not meet final cleanup levels but may be useful to mitigate some public hazard or to contain contamination.

While no live radiological agents were employed in this demonstration, critical operational insight was gained by the response community. This event continues the applied radiological cleanup research conducted by EPA ORD at bench and pilot scales over the last several years. In attendance were senior officials from Ohio EPA, Columbus, OH City Council, first responders from the U.S. and Canada, as well as representatives from New York City, the Navajo Nation, the United Kingdom, the Federal Emergency Management Agency, Battelle Memorial Institute and others. Watch the Toolbox of Technology video to learn more.